EFFECTS OF PLYOMETRIC TRAINING ON START AND TURN SKILLS AMONG COMPETITIVE SWIMMERS

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CHAPTER -I
INTRODUCTION

"Champions are made or born, or vice versa; these and other homilies have been offered as currency to the sporting world with little or no scientific support for their validation."

Historically swimming is as old as ancient mythology but for practical purpose a review of progress over the last 50 years is all that is necessary. During this period methods of water progression have changed remarkably; each change in stroke has signalized by a corresponding increase in speed fifty years ago. The breaststroke was in general use for all purposes including racing. Then the over hand side stroke was discovered, and it becomes he vogue, with the result that all known speed standards were beaten. Later the trudged stroke was taken up and again new records were set up the in the early go's the cruel stroke took front place in popular favour's, and since then all speed records have been reduced to figures which would have appeared fantastic to the old tine performer.

Thirty years ago, the topics of discussion were whether a man would ever swim 100m. Inside 60 seconds. Skeptics and there were many skeptics in those days asserted that it was yond man's physical powers "to break the minute for the century. Now the 100m. Records stand at 47.84 Seconds on the name of P.V.D. Hoogenband of Netherlands.

In these days of crowded pools and his mileage training programs, there is little time to perfect the techniques of starting, turning and finishing. Ideally swimmers should practice these techniques while swimming repeats in practice so that neither time fro yardage is scarified. However, cycle swimming, which is necessitated by crowed pools, makes it difficult if not impossible to perform these techniques correctly.

Data gathered over several years indicate that, on the average, improved start can reduce race time in by at least one – tenth of a second.

Over the many starting styles have been used in free style butterfly and breaststroke events initially swimmers took a starting position with arms extended backward. They soon found that they could start their body moving towards the water more quickly by swinging their arms backward (action reaction principal). Therefore, they assumed a pre pratory position

with arms in front. They would swing the arm straight backward start was later replaced by a circular back wing on the theory that a longer arm swing would general additional moments and increase the distance travelled through the air.

The circular arm swing (conventical start) has now been replaced by faster methods the grab start. The grab start was introduced by Hamaure in 1960 and has rapidly gained in popularity since that time (Hamaure 1972). Several research studies have verified that grab is faster than other methods (Jargenson 1971), Rofter 1972, Nelson 1972, Bowers and Cavan 1995, Thorse 1975. The grab is superior because you can get your body moving toward the water faster by pulling against the staring platform.

Unfortunately, dry land exercises and weight – training programs in the sport of swimming frequently focus their attention on the development of upper body strength. In accordance with the concept of specificity, much time and effort has been spent on the development of specific exercises or weight training procedure that closely mimic swimming movement. Because of this it has been suggested that swimmers, in general, lack the dynamic lower body strength needed to maximize performance in the block start and tarns. This may also be because the benefits of developing explosive strength have not been properly investigated.

In competitive swimming, the fundamental goal is to cover a set distance in the least amount of time (Adrian's Cooper, 1995). The swimming starts has been defined as including those events that takes place between the command, "take your marks" and the of beginning the first stoke (Ambruster, Allen, Billingsley, 1973).

It has been said that start times account for approximately 25%of the total time spent swimming 25 yards, 10% of the time in 50 yard races and 5% of the time for 100 yard race. Although the time that a swimmer spends starting in an event is invariably less than they spend stroking or turning. The difference between winning and losing a race are often so small that this can be decisive (Adrian and copper, 1995). It can also be said that the technical success of the start, as with many other sports, sets the athlete up for the race too follow.

The main aim of the swimming start is to propel the swimmer away from the starting block as quickly as possible and with the greatest momentum that can be developed. Due to

this the swimming block starts can be seen as an explosive event with a movement pattern which requires high force production over a short period of time.

There have been many starting styles used in past years. The circular backswing method has how been replaced by the grab start. Shins Groppel (1984) reported that in the early 1970's the conventional arm swing start lost its popularity to the grab start. The grab start technique is performed by gripping the front edge of the starting block with the hands while in the set position. Hanauer introduced this start in the late 1960's and although there has been some dispute, over which starting technique is most effective, the grab start is and widely used method of starting at all levels of competition. (Gairmuraes and Hay,1995, meglischo, 1993).

Plyometrics were developed in the mid 1960's as a training method to relate muscular strength and power (Adams 1985).Although researches articles "plyometrics" somewhat differently, despains and Chevertle (1987) point put that most agree the term refers to exercises that are characterized by powerful muscular contractions in response to rapid, dynamic loading or stretching of the involved muscles. This loading or stretching of the involved muscles is an
advantage of plyometric exercises in that they involve the dynamic stretch shorten cycle movement similar to those adapted in sporting action (young 1991).

Traditionally plyometric training uses the acceleration and deceleration of the body weight as the overload in dynamic activities such as depth jumps and bounds (Thomus 1998). These activities eliminate the deceleration phase seen in traditional weight training activities or training methods. This is due to the body not having to achieve zero velocity at the end of the concentric movement. Therefore, plyometrics involve the production of high forces and acceleration throughout the entire range of motion, which is again specific to most athletic movements like the swimming block start.

Another advantage is that plyometrics are also performed at higher velocities than traditional weight training methods, increasing their specificity to competitive performance (Young 1991).

Only vague records of early swimming exist but they indicate that swimming grew up with Ma from the early stages of his appearance on the Earth. When early Man needed to

move on land, he either walked or ran when early Man needed to move across water he probably waded, and then eventually swam by watching the example set by other primarily land based animals. The word need is used somewhat cautiously here because there must have been long periods when the climatic conditions made it impossible for people to swim. The ability to swim, however poorly, would probably have been part of the dexterity of early hunters, and the need to hunt would certainly have been a reason to swim.

Swimming start has come a long way since the bottom first entry used in 19th century. In current completive swimming the dive start is acritical component of swimming performance. This is especially true for the shorter distance where the starts have been estimated to contribute up to 30% of the total race in 50 m spirits. Numerous examples can be cited to highlights the importance of start in the men's50m freestyle final in Sydney Olympic Games there was only 0.05separating in 1st and 3rd place and in the same event at the 2003 world championship 0.52s separated 1st and 8th place. T the 1996 Olympic, Scott miller lost the 100m butterfly final to Dennis Pankratov by 0.28seconds although he was already 0.40 behind at the initial 15m mark.

Therefore, a small improvement in the event placing despite the importance it is still common for swimmers and coaches to select their staring technique using a follow the leader approach by mimicking the technique (Dr. Aemdra little 2005) used by successfully swimmers rather using objective information. In current competitive the swimming start is critical component of swimming performance start is playing important role in competitive swimming which start is better for age group swimming? What difference in deferent starting style. This is area of this study also relation of explosive strength with competitive starts.

It is a combination of strength and speed abilities. It can be defined as the ability to overcome resistance with high speed (Hardayal singh 1991).

Explosive strength always finds expression of motor movements i.e., it is form of dynamic strength explosive strength performance are markedly influenced by the level of motor co – ordination as a result explosive strength is highly to the nature of a movement and for its

development of specific movements or part of the movement must be used as exercise. A high percentage of movement in sport is of explosive nature and involves overcoming of same external resistance or one's body weight and plyometrics training.

Performance in the start is strongly related to overall swim performance. (Ross Sanders, Bonner Stephen, 2001).

1.1 Statement of the Problem

While going through the literature available in the library and the discussion with the faculty members in relation with the topic, the research scholar will undertake the study stated As "Effects Of Plyometric Training On Start And Turn Skills Among Competitive Swimmers"

1.2 Significance of The Study

The significance of the study will be justified on the basis of the following basis:

1. The study may be helpful for physical education teachers and coaches.
2. The findings of this study will assist in designing suitable training program to achieve good swimming performance.
3. The finding of the study will help to know the effects of plyometric training on starts skill among competitive swimmers.
4. The finding of the study will help to know the effects plyometric training on turn skill among competitive swimmers.
5. The study will help to know the relationship plyometric training and swimming performance.

1.3 Objectives of the study

The following objectives of the study are as

1. The primary objective of the study is to study effects plyometric training on start skill among competitive swimmers.
2. The secondary objective of the study is to study effects plyometric training on turn skill among competitive swimmers.

1.4 Hypothesis of The Study

On the bases of available literature and discussion with experts as well as the research scholars own understanding, It is hypothesis that:

1. **H1**. There will be significant effects of plyometric training on turn among competitive swimmers.

2. **H2.** There will be significant effects of plyometric training on start among competitive swimmers.

1.6 Delimitations

The study will be delimited for the swimmers who have participated at district and state level.

1. The study will be delimited to the swimmers aged between 12 to 25years.
2. The study will be delimited to the swimmers Pune district of Maharashtra state.
3. The study will be further delimited to 100 swimmers (50 plyometric swimmers for experimental groups and 50 swimmers for control group).

1.7 Limitations

The study would be limited in the following aspects:

1. There will be no control over environmental and nutritional factors of the swimming players.
2. The effects of uncontrollable factors like climatic conditions, dietary habits and emotional conditions etc. at the time of testing might influence the results of the study.
3. Economic Status not considered.
4. In this study caste & Religion of the Subjects will not considered.

1.8 Definitions & Explanation of terms

Training:

The action of undertaking a course of exercise and diet in preparation for a sporting event.

Plyometric training:

Plyometric, also known as "Jump Training" or "ploys", are exercises in which muscles exert maximum force in short intervals of time, with the goal of increasing power (speed-strength).

Grab start:

The swimmer starts by grabbing the starting block and placing the hands either between or outside the feet, pulling on the block to then overbalance into the water, therefore achieving a faster start.

Flip turn:

A tumble turn, or flip turn is a technique of turns in swimming, used to reverse the direction in which the person is swimming. It is done when the swimmer reaches the end of the swimming pool but still has one or more lengths to swim.

Competitive swimmers:

Competitive swimmers refer to those swimmers, who are able to take competitions in swimming at school and college level.

CHAPTER- II

REVIEW OF RELATED LITERATURE.

Review of related literature is very important, and it plays a vital role to understand the problem thoroughly. In the present chapter the investigator is made an attempt to report the literature based upon study of physiological and physical, psychological and anthropometric of different sports and swimming. A study of relevant literature is an essential step to get a full picture of what has been done and said abroad and in one's own country with regard to the problem. The researcher has gone through various databases to find out the related studies which are presented below:

Berryman(2010) "Effect of plyometric vs. Dynamic weight training on the Emery cost of Running' 'They found an interaction between time and group($p<0.05$) and an effect of time($p<0.01$) for C. All groups showed improvements of running. Plyometric training were more effective than DWT in improving Cr in moderately to well-trained male endurance runners showing that athletes and coaches should include explosive strength training in their practice with a particular attention on plyometric exercise. Further research is needed to establish the origin of this adaptation.

Rajamohan (2010) the purpose of this study was to evaluate the effects of a complex training program a combined practice of weight training and plyometric, and contrast resistance and plyometric training on selects. Strength and power parameters in young healthy athletes. Thirty young athletes aged 19-21 years old, from the department of Physical Education and sports sciences, Annamalai University were selected as subjects.

Kassem Handy(2010) this study aimed to identify the effectiveness of plyometric exercise on the special physical abilities and skillful performance of basketball players. It was applied to a sample of 20 players of 16 years old from ELShoban EL-Muslmeen club in port said

They were divided into two equivalent group (experimental and control group) of 10 players each. The experimental group applied the plyometric exercise, and the control group applied the usual program.

The program was applied for 12 weeks with 3 training units at 120 minutes for each unit. Through the unit, the exercises were united between the two groups except for the part of the special physical preparation. The experimental group performed the plyometric exercise while the control group performed the physical exercise. Then the scientific coefficients were applied to test using a sample outside the study sample. The scientific coefficients of constancy were between 0.764 and 0.970 and the reliability was between 0.903 and 984.

The result pointed to a significant progress in the improvement percentages for the experimental group in all study tests compared to the improvement percentages of the control group. Which were respectively: test of vertical jump at 27.10% medicine ball push (3kg) at 20.14% running 30mx5nat 1.62 and shuttle.

Jothi K et.al (2010) the underlying principle of the study was to assess the effect of eight weeks concurrent strength and plyometric training in enhancing the selected bio motor abilities. For the purpose of this study, thirty male volleyball specialization students from the department of physical education and sports sciences, Annaamlai, University, aged 20 to 22 years took part in the study. Subjects were randomly assigned to either concurrent training (n-15) or control (n=15) group. The training regimen lasted for eight weeks. The selected criterion variables were assessed using standard tests and procedures, prior to and immediately after the training program. Analysis of covariance was employed to establish the degree of significant modification.

On chosen criterion training had an effectiveness of 4.13% on leg strength 11.81%on strength endurance, 0.40% on speeds, and 7.53% on anaerobic power.

Eduardo Sa (2008) the purpose of this study was to examine the effect of Difference plyometric training volumes on maximal strength vertical Jump performance, and sprinting ability. Forty-two student were randomly assigned to 1 of 4 groups: control (n-10, 7 sessions of drop jump (DJ) training, 1 day per week,420 DJs), 14 sessions of DJ training (n= 12, 2 days per week, 840 DJs), and 28 session of DJ training (n=9, 4days per week, 1680 DJs). The training protocols included DJ from 3 different heights 20, 40, and 60 cm. Maximal strength (I repetition maximum [1RM] and maximum isometric strength), vertical height in countermovement jumps

and DJs, and 20-m sprint time tests were carried out before and after 7 weeks of plyometric training.

No significant differences were observed among the groups in pertaining in any of the variables tested. Short-term plyometric training using moderate training frequency and volume of jumps (2 days per week, 840 jumps). Produces similar enhancements in jumping performance, but greater training efficiency (; 12% and 0.011% per jump).In addition, similar enhancements in 20-m-sprint time jumping contact times and maximal strength were observed in both a moderate and low number of training sessions per week compared with high training frequencies, despite the fact that the average number of jumps accomplished in 7s (420 jumps)and 14S(840 jumps) was 25 and 50% that performed in 28S (1680 jumps)these observations may have considerable practical relevance for the optimal design of plyometric training programs of athletes, given that a moderate volume is more efficient that a higher polymeric training volume.

Bishop et.al (2009)., DC, Smith, RJ, Smith, MF, and Rigby, HE. Effect of plyometric training on swimming block start performance in adolescents. J Strength Cond Res 23(7): 2137-2143, 2009-This study aimed to identify the effect of plyometric training (PT), when added to habitual training (HT) regimes, on swim start performance. After the completion of a baseline competitive swim start, 22 adolescent swimmers were randomly assigned to either a PT (n = 11, age: 13.1 ± 1.4 yr, mass: 50.6 ± 12.3 kg, stature: 162.9 ± 11.9 cm) or an HT group (n = 11, age: 12.6 ± 1.9 yr, mass: 43.3 ± 11.6 kg, stature: 157.6 ± 11.9 cm). Over an 8-week preseason period, the HT group continued with their normal training program, whereas the PT group added 2 additional 1-hour plyometric-specific sessions, incorporating prescribed exercises relating to the swimming block start (SBS). After completion of the training intervention, post-training swim start performance was reassessed. For both baseline and post-trials, swim performance was recorded using videography (50Hz Canon MVX460) in the sagital plane of motion. Through the use of Silicon Coach Pro analysis package, data revealed significantly greater change between baseline and post-trials for PT when compared with the HT group for swim performance time to 5.5 m (−0.59 s vs. −0.21 s; $p < 0.01$) and velocity of take-off to contact (0.19 ms−1 vs. −0.07 ms−1; $p < 0.01$). Considering the practical importance of a successful swim start to overall performance outcome, the current study has found that inclusion of suitable and safely implemented PT to adolescent performers, in addition to HT routines, can have a positive impact on swim start performance.

CHAPTER III

METHODOLOGY

Methodology is the description of procedure or technique adopted in research study. The machinery or methodology occupies a very important place in any kind of research. The vehicle of research cannot perform its functions without it, since it is methodology which lays out the way of their search variables and procedure. The researcher has chosen the experimental method for this study.

3.1 Sample Size

After due consideration of all the points, the 100 male swimmers participated in district & state and inter collegiate swimming competition of 12 – 25 age group having no past history of plyometric training will be randomly select for the study. The selected subjects will be educated regarding the study, procedure, instructions, and significance of the study.

3.2 Sampling Method

These 100 subjects will randomly divide in to two groups, 50 swimmers for experimental group and 50 swimmers for control group.

Two groups will be targeted - experimental group and control group.

3.3 Sampling Frame:

The Universe of the study shall be the swimmers who has been minimum participating in district and state level competition

3.4 Research Design

The design in a research study refers to "the researcher's overall plan for answering the researcher's question or testing the research hypotheses". The research design of the study

is to experimental. The experimental method is the most scientific of all methods. The main problem with all the non – experimental methods is lack of control over the situation. The experiment is described as the cornerstone of psychology: this is due to the experiments play central role in many of the physical science and to psychology's historical view of itself as a science. A considerable amount of research uses the experimental method.

An experiment is a study of cause and effect. It differs from non – experimental methods, it involves the manipulation of one variable, while trying to keep all other variables constant.

3.5 Ethical Consideration:

In collecting the data, the researcher Follow to ethical guidelines, principles, and standards for studies conducting with human beings. The study will include safeguards for protecting humans, which involve three major ethical principles: beneficence, respect for human dignity, and human justice. Beneficence is the protection of participants from physical and psychological harm, exploitation, and performance of some good. The risk/benefit ratio of participation weighs the risk to participants against potential benefits to society. Beneficence implies maximizing benefits over risks. Respect for human dignity will involve the participant's right to self-determination (freedom to control own activities including participation in study). Justice includes the right to fair treatment (both in the selection of participants and during the course of the study) and right to privacy (through confidentiality procedures that safeguard information that participants provide).

3.6 Tools of The Study

Gym centre, swimming pool, stretch cards, jump boxes, Flippers, Weight belts, Mats, Cones, Lime powder, starting blocks, stopwatch, measuring tape was used for collection of data.
Selection of variables

The following variables were selected

i) Grab start

ii) flip turn

3.7 Technique of data collection:

Pre Test Score - Before the experiment the total performance of grab start & flip turn will be noted & will called as score of pre test.

Post Test Score – After the successfully completion of plyometric training the total performance of grab start & flip turn will noted & will called as score of post test.

For Grab Start & Flip Turn the distance travel under water in meters will be noted, by putting cons parallel to the points the head going under water & coming out of water by distance measuring testers, in meter. The score will take separately of every subject. Simultaneously the time score of will take the total time period taken to travel under water &was noted.
This score will be treated as a raw score & convert into a score with calculating T Scale.

3.8 Administration of the test

Grab start

The grab start is done with both feet next to each other, about 1 foot apart, and your toes curled over the edge to improve your grip. Your body is bent over with your knees slightly bent to improve your spring action off the block. When you bend over to grab the block and wait for the final GO, it is very important that you put your weight in front of your toes and not on your heels, so in other words, you should lean a bit forward while supporting your weight by holding the block. Be careful though, so you don't lose your balance and get disqualified by an early start or by falling into the water. This lean forward technique needs to be practiced as it fully depends on individual preference and hamstring flexibility. If done properly, it will allow you for a faster reaction time off the block. So, after the whistle, you just shoot out forward and not rock back to your heels and then back to your toes again. Just your toes. Your fingers should be wrapped around the block on the outside of your feet and if possible, grabbing the block. Your eyes are looking directly at your toes, NOT behind your or NOT forward. So when you are all ready for the starting bang, you are bent over, leaning slightly forward, your head is lowered with your eyes looking at your toes.

Pretend like you are a loaded spring, just about to explode when the starting whistle sounds. Right after the start your first movement should be with your arms and fingers. It does sound weird, but you should pull up and pull slightly back on the block to prevent you from rocking back to your heels and then to your toes again. This pull up will give you the starting momentum forward which you will then complete with the push from both of your feet at the same time

Flip turn

The faster you swim into the wall, the more energy you have available to convert into a fast spin. And the faster you spin, the easier it will be to blast off the wall. Power through those last couple of meters with a strong kick and you may be surprised at how quickly your feet land on the wall. Every breath takes you out of streamline position, which decreases your momentum. On that last stroke before the wall, you want to maximize (not decrease!) the amount offorward energy you are carrying into the turn. Again, breathing on the first arm stroke after the turn takes you out of streamline position and bleeds forward momentum at a critical moment. (The fastest you're ever going in a pool is in the first few meters after you have pushed off the wall.) Plus, your first arm stroke will be most powerful if your head is in a neutral position, rather than turned to the side. You will actually spin faster, and your feet will arrive on the wall more

quickly if you throw them straight over the top, as opposed to over the top and slightly off to the side. If you are flipping your feet straight over the top but twisting onto your stomach before pushing off the wall, you are likely spending at least one -- if not three -- seconds ON the wall, where your speed is exactly zero meters per second. Instead, push off the wall the instant your feet land there. (You should be on your back.) Twist as you streamline kick to the surface.

3.9 Research Gap

There are very less research study of plyometric studies on swimmers in past and specially effect on start and turns which require explosive strength so researcher taken this topic to explore the effect of plyometric training on start and turn skills among competitive swimmers.

4.0 Statistical Technique

In order to examine the hypothesis of the study, descriptive statistics such as mean, standard deviation and comparative statistics such as paired sample t-test and ANCOVA will be applied and will be tested at 0.05 level of significance.

Tentative Chapterization:

The present study will be divided in the following chapters:

Chapter - 1

The Chapter One outlines the background of the problem under consideration, its significance in the present scenario, the scope of the study, objectives the research intends to achieve and hypotheses to be established. This chapters also includes the definition and explanation of important technical terms related to the study.

Chapter - 2

The Chapter Two undertakes the review of literature related to the present topic of study and tries to define the problem under consideration in a proper way. the chapter defines important terms and concepts in a proper way to give readers an understanding of various terms in the research report. The chapter identifies the research gaps between the problem under consideration and the available literature on the issues and strongly recommends further exploration on the problem.

Chapter - 3

This includes a detailed methodology of conducting research on the issue under consideration and various components of research design such as the universe, the sample, types of data, tools of data collection, technique of data collection, ethical consideration and methods use to analyse data.

Chapter - 4

The Chapter includes the interpretation of data and results of the study. The results of the study will be illustrated through suitable table and figure. This chapter will also include the discussion of findings.

Chapter - 5

The Chapter five summarizes the findings of the study and conclusions derived thereof. The research has also made some valuable suggestions for further research.

Appendix-1

Exercises of Plyometrics Training

1. Standing Long Jump
2. Tuck Jump
3. Vertical Jump
4. Stadium Hop
5. Box To Box Jump

PLYOMETRIC TRAINING PROGRAMME FOR 12 WEEKS

1st and 2nd week 2 set three min rest after one exercise

Warm-Up Standing	Long Jump	Tuck Jump Vertical	Jump	Stadium Hop Box to Box	Jump
15 Min	Repetition 6	Repetition 6	Repetition 6	Repetition 6	Repetition 6

3rd and 4th week 2 set three min rest after one exercise

Warm-Up Standing	Long Jump	Tuck Jump Vertical	Jump	Stadium Hop Box to Box	Jump
15 Min	Repetition 8	Repetition 8	Repetition 8	Repetition 8	Repetition 8

5th and 6th week 2 set three min rest after one exercise

Warm-Up Standing	Long Jump	Tuck Jump Vertical	Jump	Stadium Hop Box to Box	Jump
15 Min	Repetition 10	Repetition 10	Repetition 10	Repetition 10	Repetition 10

7th and 8th week 3 set three min rest after one exercise

Warm-Up Standing	Long Jump	Tuck Jump Vertical	Jump	Stadium Hop Box to Box	Jump
15 Min	Repetition 10	Repetition 10	Repetition 10	Repetition 10	Repetition 10

9th and 10th week 3 set three min rest after one exercise

Warm-Up Standing	Long Jump	Tuck Jump Vertical	Jump	Stadium Hop Box to Box	Jump

15 Min	Repetition 12	Repetition 12	Repetition 12	Repetition 12	Repetition 12

11th and 12th week 3 set three min rest after one exercise

Warm-Up Standing	Long Jump	Tuck Jump Vertical	Jump	Stadium Hop Box to Box	Jump
15 Min	Repetition 15	Repetition 15	Repetition 15	Repetition 15	Repetition 15

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